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AN ELECTRIC APPLIANCE CAMPAIGN.



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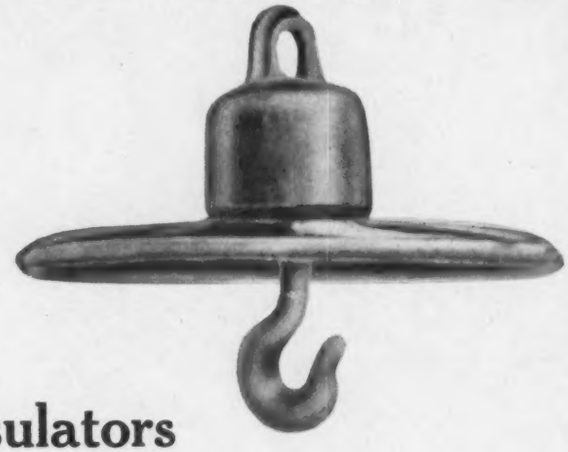

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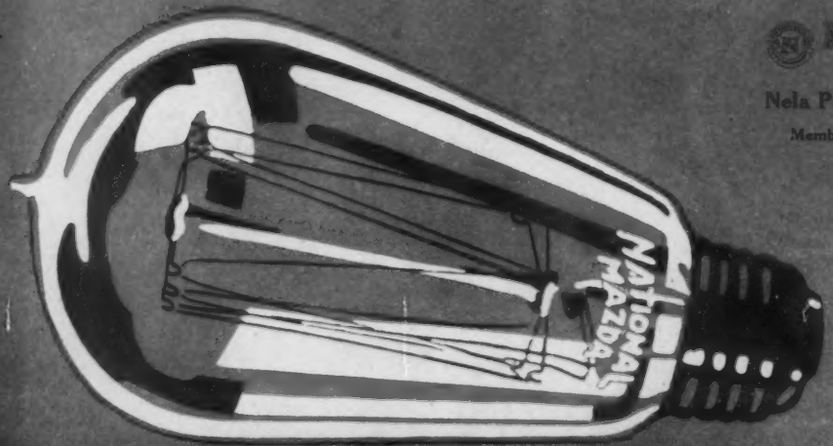


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JOURNAL OF ELECTRICITY
POWER AND GAS
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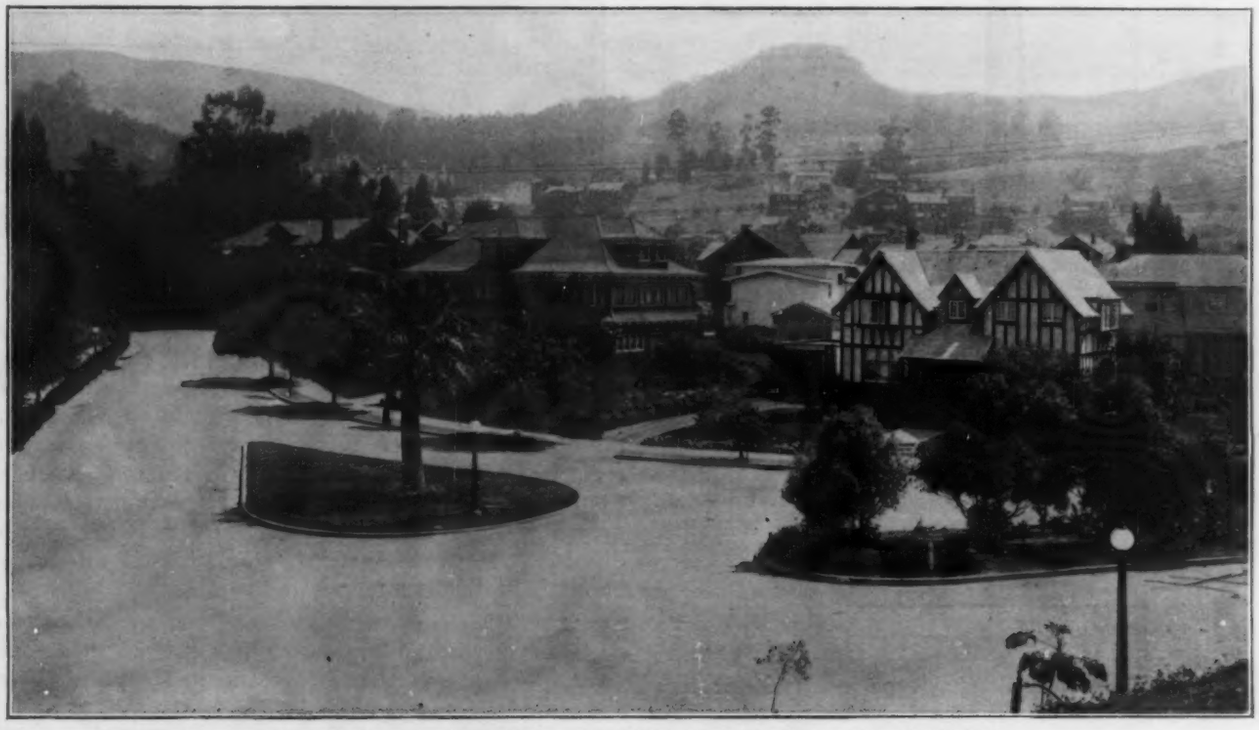
# BERKELEY'S ORNAMENTAL LIGHTING SYSTEM

BY T. M. STATELER.

*(This contribution to the literature of street illumination describes a recent series lighting installation equipped with special transformers and new protective devices. The author is illuminating engineer with the Pacific States Electric Company at San Francisco.—The Editor.)*

The city of Berkeley, California, has recently completed a street lighting system in the exclusive Claremont residence section that is worthy of mention. This section of Berkeley lies largely in the low approaches of the Coast Range, which are immediately back of the east bay cities, and affords most advantageous villa sites, with views of bay and ocean that will compare favorably with any throughout the world. Some of the most beautiful mansions on the Pacific slope are to be found in this district.



A Typical View of Berkeley's Beautiful Ornamental Residence District.

Due to the contour of the land and the fact that many of the streets are narrow and laid out in broad curves, it was not deemed necessary to place the lamps as close together as is customary and a large area was lighted with a comparatively small number of units.

Two hundred thirty six steel standards have been installed, each supporting a 16 in. ball globe with ventilating cap; 88 standards carrying a 250 c.p. 7.5 ampere series lamp and 148 equipped with 100 c.p. 7.5 ampere series lamp. In addition to these lamps 18 electroliers installed some years ago were changed over from multiple to series and connected with the new system.

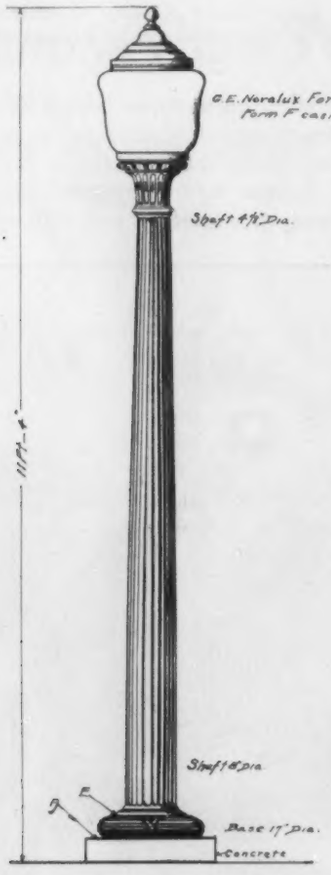
The entire system was segregated into five separate loops with approximately one-fifth of the total lamps on each loop, each supplied by an individual S. L. transformer built by the General Electric Company especially for this installation and supplied and installed by the Pacific Gas & Electric Company. The primary windings of the transformers are connected in series with the existing 7.5 ampere arc lamp circuits, being designed for a 1:1 ratio of current transformation. The lamps are connected in series on the secondaries of these transformers. This plan prevents the high voltage of the series arc circuit from being impressed on the incandescent lamp system, thus saving in cost of insulation and increasing the safety of this system.

While these 1:1 series transformers, known as

type S. L. had been in general use for a number of years, this is the first time they have been used in such large sizes. The Claremont lighting project employs one 5 k.v.a., two 7½ k.v.a., and two 10 k.v.a., type S,L, transformers.

Each incandescent lamp is provided with a device in the socket known as a "film cutout." In case a lamp burns out the cutout will automatically complete the circuit through the socket without interfering in the least with the other lamps on the circuit.

Likewise, a protective device is used with each type S.L. transformer so that in case its secondary circuit is open for any cause, the entire transformer will be shorted out and operation of the remainder of




Typical Lamp Design

the series arc circuit and other type S.L. transformers not interfered with. This also prevents the danger of high voltage on the incandescent lamp circuit which normally would occur with a series transformer operating with open circuited secondary. The film cutouts used for these protective devices were developed in the research laboratory of the General Electric Company especially for the Claremont system, as they required a much higher breakdown voltage than the cutouts in general use for single series lamps. These special film cutouts consist of two discs of metal, separated by insulation with pointed indentations spaced so that arcing will occur at the breakdown voltage for which they are designed.

The standards are spaced about 200 ft. apart, staggered, and are of two heights, 10 and 12 ft. to lamp filament, the higher standards being located on the wider streets. They are simple in design, consisting of a modified Corinthian capital, fluted shaft made with correct entasis and stopped flutes gracefully tapered and correctly proportioned throughout. Most standards in the past have presented an appearance all out of proportion to the ball globe and in making the selection of the Claremont standard the Civic Art Commission of Berkeley considered that out of a large number of designs the one selected more nearly filled all requirements than any other submitted. They were manufactured by the Union Metal Company and are made of high grade copper-bearing non-oxidizing pressed steel.

The cable employed, manufactured by the General Electric Company, was No. 8 B. & S. gauge 3/64 in. rubber insulated protected with a lead sheath 5/64 in. in thickness. When it was necessary to cross the street

Typical Lighting Standards as Installed.

to an electrolier duplex cable was used and a T joint made in a cast iron junction box in the main runway, the box being filled with pothead compound when joint was completed. This cable is built to withstand a pressure of 2500 volts and factory specifications called for a test of 5000 volts. The city engineer's specifications called for cable to show an insulation resistance ground. Cable was drawn into 1 in. and 1¼ in. hot dipped galvanized electrical conduit, and altogether about 11 miles of street is lighted.

The system presents an excellent appearance by day and at night illumination has proved most efficient. No attempt has bee made to light the street and sidewalk spaces brilliantly, but to imitate as far as possible the soft diffusion of full moonlight and the result has been very successful.

In considering this installation, Mr. Fred T. Robson, commissioner of public works, Berkeley, insisted that the cost be kept within a price of 30c per front foot and how well his engineering department planned is shown by the fact that the ultimate cost to the property owners was but 27.6 per lineal foot. The work was originally conceived by Mr. Robson and his plans were carried out to a successful conclusion by the able members of his engineering staff, J. J. Jessup, city engineer and his assistant, E. N. Prouty, and to these gentlemen the writer is indebted for the information contained in this article. The Pacific Fire Extinguisher Company were the contractors on the job.

## MAGNETIC PERMEABLE CYLINDRICAL CONDUCTORS.

BY CLEM A. COPELAND.

*(Hitherto in his treatment of skin effect, the author has limited his discussion to considerations of non-magnetic materials. In this article, however, he boldly steps forth into a discussion of the phenomena of skin effect in their bearing upon conductors composed of magnetic material. His conclusions have an important practical bearing when such installations as the steel cables of Carquinez crossing and similar structures are considered.—The Editor.)*

### Solid Wires or Rods and Cables.

The introduction of $\mu$, the permeability of iron steel, nickel and cobalt into the argument $\varkappa$, thus:

$$\varkappa = 22.570 \sqrt{\mu f/10^9 \rho}$$

has often been assumed, to result in finding $\mathbf{K}_R$ and $\mathbf{K}_L$ by reference to Table I. Many published papers have inherited, one after another, this popular fallacy, or at least by the use of $\mu$ in various skin effect formulae, have created the impression that it was only necessary to insert some value say $\mu = 500$ in the formulae to determine the skin effect.

This however is impracticable since the development of all skin effect formulae assumes some hypothetical medium which has a constant permeability for all values of magneto-motive-force that is, for all values of current in the conductor which produces the lines of force within it. Practically this is only so when $\mu$ is unity, as in copper and other non-permeable substances.

Curiously enough, in the special case of low current strength in small permeable wires the skin effect on the internal self-induction; and therefore on $\mathbf{K}_L$ is as though $\mu$ was constant up to a current strength of about .4 of an ampere in No. 5, and as high as .75 and 2.0 amperes in No. 9 and No. 14 B. W. G. "B. B." iron wires respectively, even with frequencies as high as 140. Thus Kennelly states that a number of measurements upon ordinary iron telephone and telegraph wires with these feeble currents seem to show that $\mu$ has a constant average value of about 150. This fact however does not apply to the determination of $\mathbf{K}_R$ and is of no practical use, especially as $\mu$ varies widely from the average of 150 for small currents in different qualities of iron and steel and different sizes of the same quality and one may better find $\mathbf{K}_R$ and $\mathbf{K}_L$ directly by test or from the curves which follow (which have been established by tests) than to determine $\mu$ by test and insert it in any formula.

That skin effect formulae practically are inapplicable to permeable substances is readily seen to be due to the fact that at every instantaneous value of the current throughout a complete cycle there exists a different value of $\mu$ along the permeability curve. The result is complicated by the hysteresis loss during the cycle of magnetization, demagnetization, reversal, remagnetization and redemagnetization. , $\mathbf{K}_R$ and $\mathbf{K}_L$ are therefore intricate functions of the current as well as $\mathbf{r}_1$, $\mu$, f and $10^9 \rho$.

If a curve be plotted with currents, **I** as ordinate and $\mathbf{K}_R$ = ratio $\mathbf{R}_{ac}/\mathbf{R}_{dc}$ as abscissae, it will follow the general trend of a ($\mu$, H) curve as would be expected; in fact at every value of **I**, knowing $\mathbf{K}_R$ experimentally, a so-called equivalent ($\mu$, H) curve can be plotted by means of the argument $\varkappa$ and Table I. Such curves have been plotted by the U. S. Bureau of Standards and are shown to have the same trend as the ($\mathbf{K}_R$, **I**.) curves shown herewith. It should be

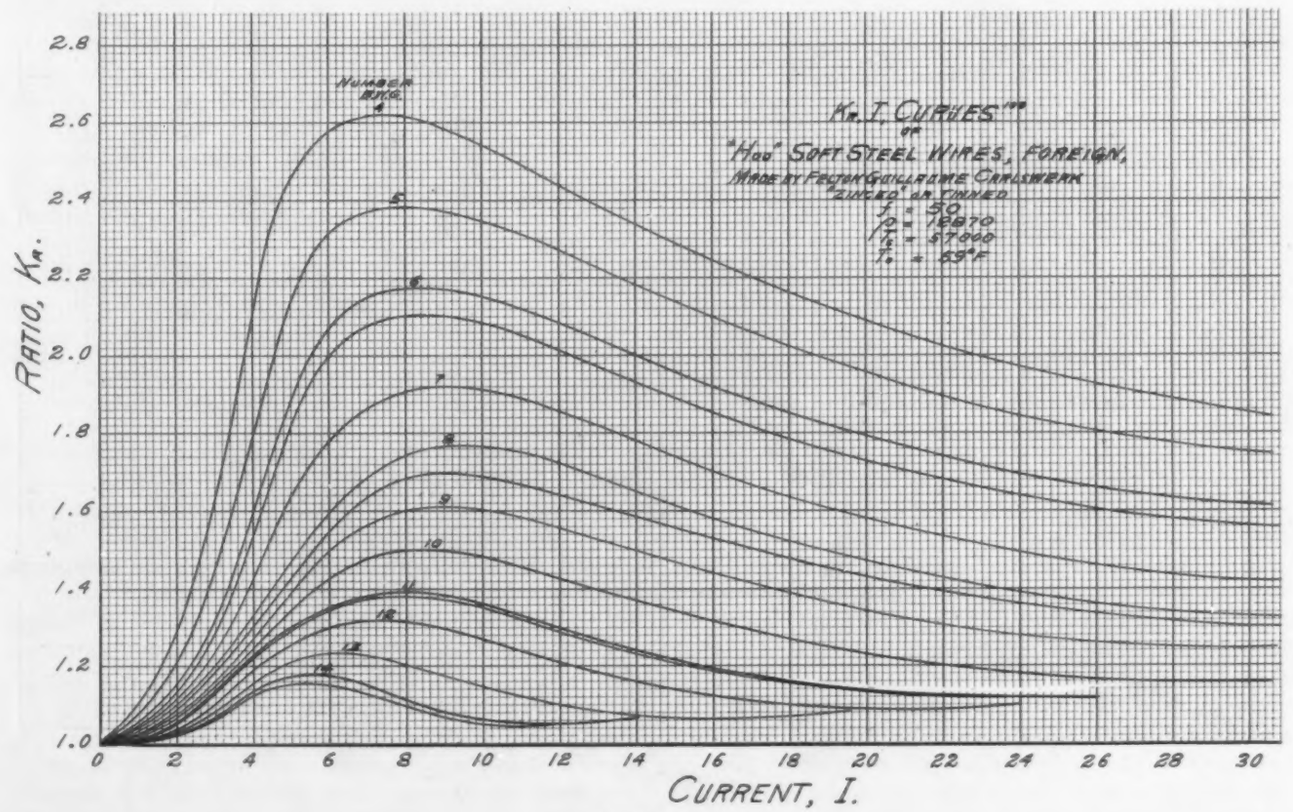
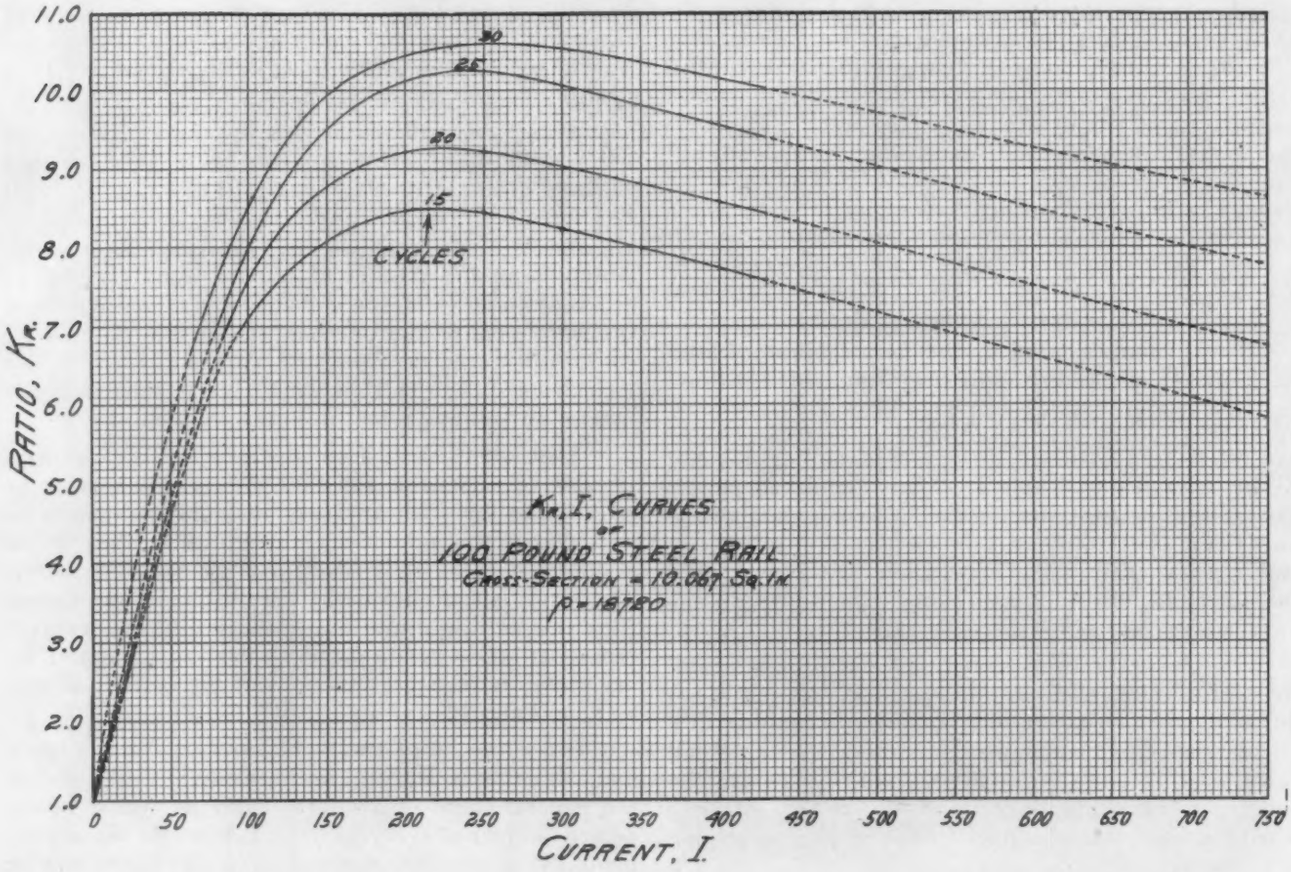



Fig. 6.


11.0
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
RATIO, $K_n$.
30
25
20
15
CYCLES
$K_n$, I, CURVES
OF
100 POUND STEEL RAIL
CROSS-SECTION = 10.067 SQ. IN.
$\rho$ = 16720
0 50 100 150 200 250 300 350 400 450 500 550 600 650 700 750
CURRENT, I.

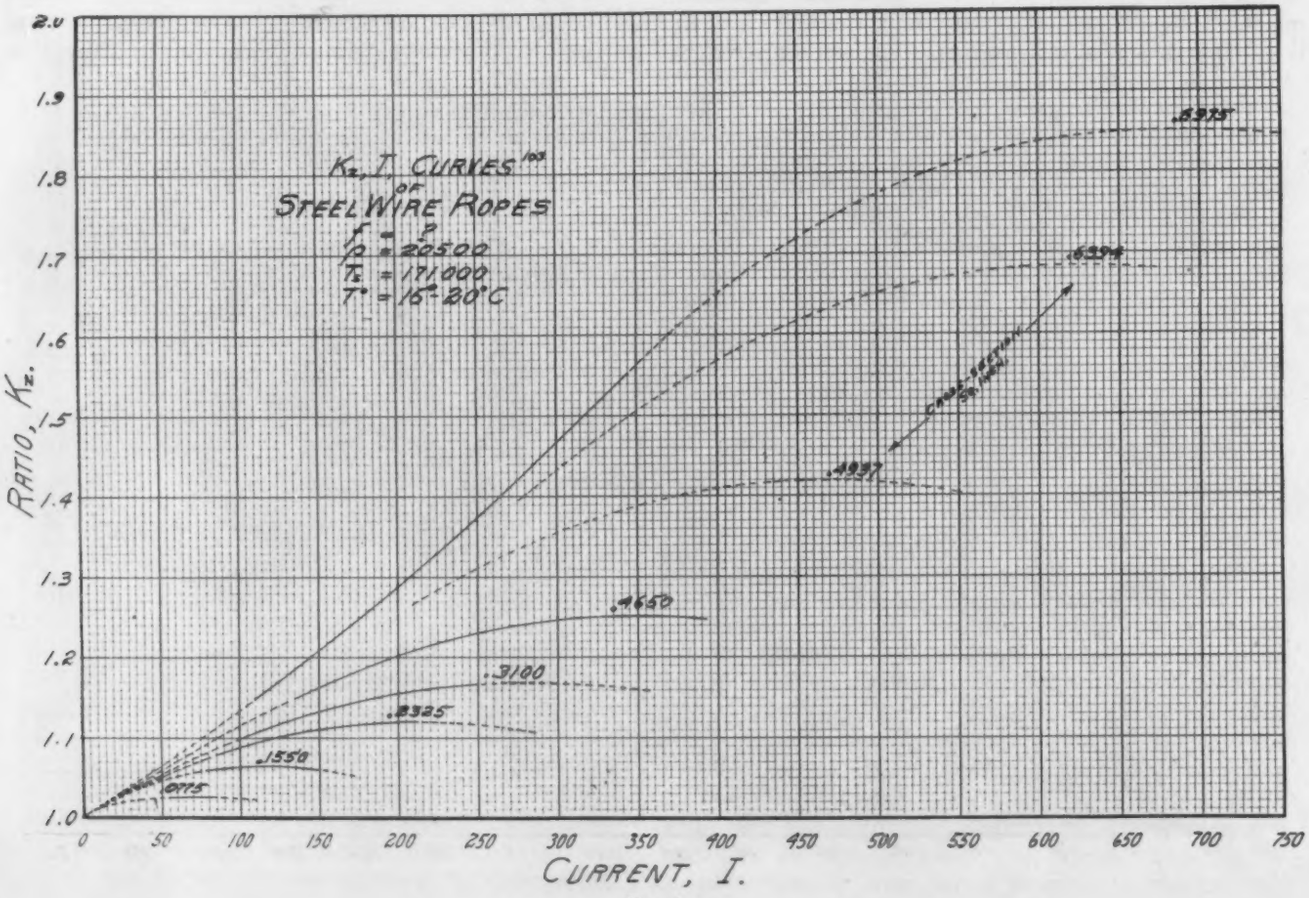

2.0
1.9
1.8
1.7
1.6
1.5
1.4
1.3
1.2
1.1
1.0
RATIO, $K_n$.
$K_n$, I, CURVES for
STEEL WIRE ROPES
$\rho$ = 20500
$E_1$ = 171,000
$T°$ = 16°-20°C
.6975
.6394
.4937
.4650
.3100
.2325
.1550
.0775
0 50 100 150 200 250 300 350 400 450 500 550 600 650 700 750
CURRENT, I.

Fig. 8.

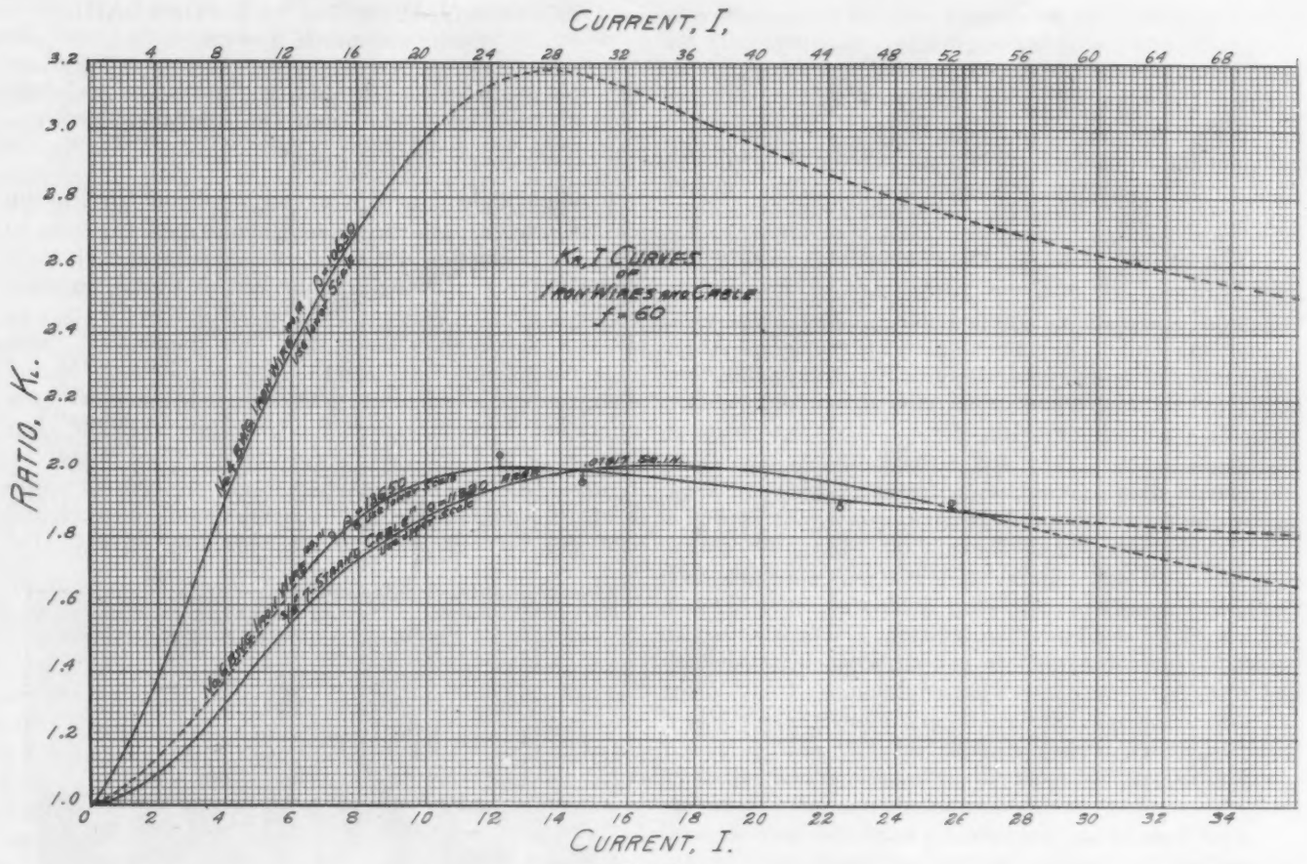



Fig. 9.

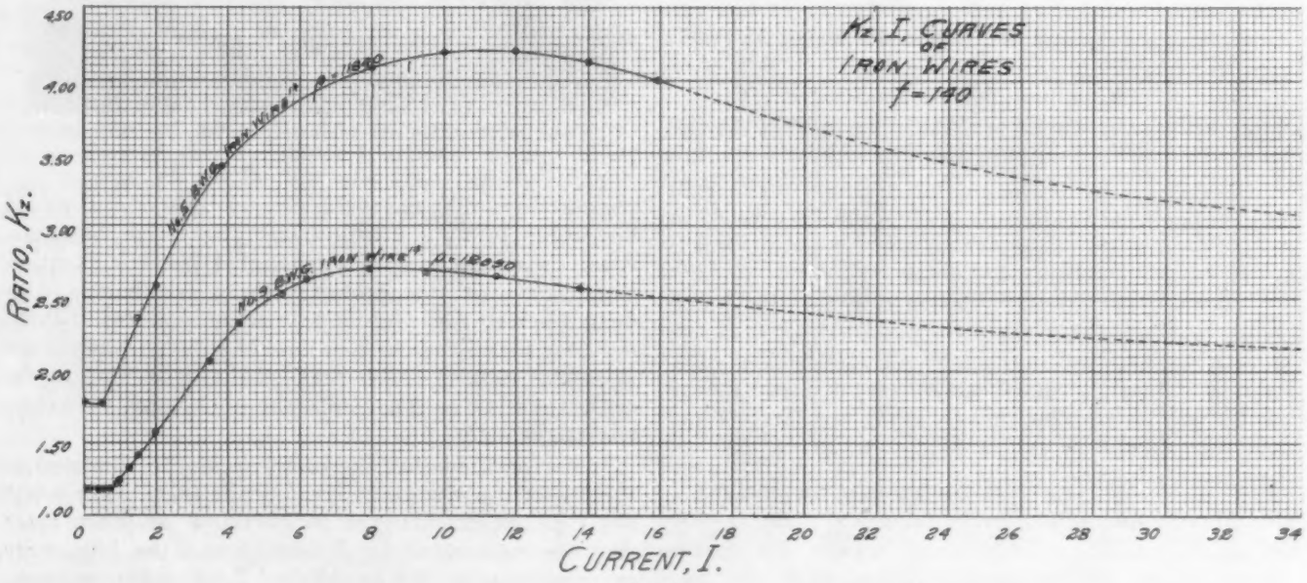



Fig. 10.

noticed that these ($\mu$, I.) curves exhibit the phenomena of circular transverse concentric magnetization and are materially different from a ($\mu$, H,) curve of magnetization as usually taken when the lines extend along the conductor axially, as already pointed out by the Bureau.

In Fig. 6 is shown a nest of ($\mathbf{K}_R$, I,) curves taken at 50 cycles on various sizes of wires of a soft pure grade of galvanized iron having an ultimate tensile strength of 57,000 pounds and a specific resistance of $10^9 \rho = 13{,}500$ absohms per centimeter cube or 12.90% conductivity with respect to pure copper. The unnumbered curves are those for wires of .2, .3, .4 and .5 cm. diameter, while the other curves have been interpolated on the basis of a straight line relation between the area of cross-section of a wire and the maximum value of $\mathbf{K}_R$, thus determining the curves for Nos. 4 to 14 B. W. G. wires.

Fig. 7 shows a set of ($\mathbf{K}_R$, I) curves taken at various cycles on a steel rail weighing 100.8 lb. per yd. and having a cross section of 10.067 square inches and a specific resistance of 18,720 absohms. They seem

rather irregular and no definite relation exists between the frequency f and $K_R$ maximum, due probably to the peculiar form of cross-section which causes $\mu$ to behave inconsistantly at different cycles.

Fig. 8 illustrates the results of a series of tests on steel wire ropes of 171,000 lb. per sq. in. ultimate tensile strength and a specific resistance of 20,500 absohms per cm. cube.

The figure contains "impedance-factor" curves or ($K_L$, I) curves where $K_L = \sqrt{R^2_{ac} + L^2_{ac}\omega^2}/R_{dc}$, that is the ratio of a.c. to d.c. impedance. These three sets of curves, although representing extremes of form and quality of conductors, all show the same characteristics and general trend of ($\mu$, H) curves and exhibit valuable qualitative results. Due to their representing European practice they are perhaps of less quantitative value than is desired. However, by means of various field and laboratory tests shown in Kennelley's classic article on "Impedance" in 1893 and since, together with a comparative study of American and European irons and steels by means of curves, very reliable data have been herewith compiled, which will be found consistent and in accord with all published and some heretofore unpublished data.

Other experimental data are contained in Figs. 9 and 10, which are self explanatory.

Fig. 10, at 140 cycles, has been checked satisfactorily by methods outlined in the discussion following.

The Bureau has published a large amount of data from which the present writer has interpolated many nests of curves at various cycles which have been used as a general guide, but unfortunately the tests were made on ungalvanized wire, and so are of doubtful quantitative value.

## CONCRETE VS. EARTH DITCHES WITH DROP CHECKS.

A comparison of cost of lined canals with earth canals controlled by drops for the conditions found in the system of the Imperial Water Company No. 3 is given in their printed report for 1915.

The original plan of construction for the distribution system of this company provided for concrete laterals the first mile of length out of the headings, where the slope has the excessive rate of fifty to sixty feet fall per mile. To October, 1915, four laterals had been constructed, in extent 4½ miles, at an approximate cost as follows:

| | Per lineal foot. | Per mile. |
|---|---|---|
| 25 cubic-foot capacity | $0.50 | $2,640.00 |
| 35 cubic-foot capacity | 0.625 | 3,300.00 |
| 90 cubic-foot capacity | 1.20 | 6,336.00 |

To a mile, nine to eleven drops ranging from two to five feet, depending upon the topography, are required. The average cost is $60 per structure, or for ten, amounts to $600, while the cost of excavation averages $350 and rip-rapping $100, amounting in total to $1050 per mile. Comparing the above with the cost of concrete canals which amounts to some $3000 for the same capacity ditch, the favor is toward the earth ditches with concrete drops.

Maintenance on the ditches will never be of serious moment for the grades are laid out to a fall that permits of a control of check and scour as desired, by the placing or removal of flash boards.

## "COOKING BY WIRE" AT PORTLAND.

BY GEORGE G. BOWEN.

*(This live subject is handled in a live way, giving the results of successful experience in interesting the housewife in electric cooking. The author is assistant sales manager Northwestern Electric Company at Portland, Ore.—The Editor.)*

Some little time ago we took four of the leading electric ranges and made a thorough test of each, so that we might find out the facts concerning each style ourselves. We cooked a number of meals on each range, carefully keeping the results of these tests, and after a thorough investigation, we found that these four ranges were all practical for the housewife and also durable, and that with the manufacturers co-operation we could show the consumer that the electric range is a success. We were surprised ourselves, to find that the electric range was so satisfactory, and some of our employes purchased electric ranges and installed them in their homes. We next investigated

"Cook by Wire" Store—Northwestern Electric Company, Portland.

the territory that we were serving to see if it would be profitable for us to go into the range business. After co-operating with the Hughes Electric Heating Company in a free cooking school which was conducted in one of the leading department stores of Portland, we found that a great deal of interest was shown in electric ranges, so we realized that it was up to the central station to put before the public this new electric appliance.

We realized that the public must be educated in the use of the electric range. While there were a few old type electric ranges in Portland, in most cases they were operated by domestics and the bills were extremely high. We established a rate whereby cooking would cost 3 cents per kw.-hr., and we believe today that this rate will not interfere in the sale of electric ranges.

We first installed several ranges in our general offices where we could demonstrate the electric range to our consumers. Finding that this did not prove satisfactory from a sales standpoint and that it did not add to the general appearance of the office, we decided to open up a store for the sale of electric ranges exclusively. This store is 150 feet from Washington street, the principal street in the city, and is 21x60 ft., finished in white enamel throughout. The

rear of the store is made to represent a modern kitchen, with inlaid linoleum on the floor, imitation tile on the three walls, kitchen cabinet, ice box, electric water heater, tank and kitchen table, all white enameled. A meter that measures in watt hours is installed on the electric range used by the demonstrator. We also installed a number of comfortable white enameled chairs. We have an electric fan and indirect lighting fixtures all installed with the intention of giving the store a clean and sanitary appearance. Flush receptacles are installed just above the baseboards on the sides of the store so that all ranges on display in the store can be connected.

We named this store the "Cook by Wire" store as we found this the best name from a psychological standpoint. The total cost of equipping the "Cook by Wire" store, excluding the ranges was approximately $500. The cost of operating and maintaining is $500 per month, which includes the salaries of a salesman and demonstrator. We expect to have in the store continuous monthly campaigns, with free domestic science lectures by an experienced demonstrator. We will serve luncheons to the various women's clubs of the city, giving short talks on the advantages of cooking by wire. For the first thirty days the Hughes Electric Heating Company cooperated with us in having an exclusive Hughes Campaign, and furnished Mrs. L. M. Hayes, a home economist. We sent out invitations to our consumers to attend these lectures on home economics which were to be given each afternoon. The result of this 30 days' campaign was that we sold 64 Hughes electric ranges. At the close of this campaign, we were not able to get the immediate co-operation from other manufacturers so we called on all prospects obtained from this campaign, and since, we have sold 20 Westinghouse, 2 General Electric and 5 Hughes ranges, also 2 General Electric water heaters. Two apartment houses have been equipped to "cook by wire" exclusively. They are the "Imperial Arms" with 54 and the "Ellis" apartments with 20 ranges.

We are putting into effect for the next thirty days, extremely low prices and easy terms on all electric ranges. We will sell ranges at cost, dividing the payments into a period not to exceed 24 months and no payment to be less than $3. We expect satisfactory results. In some cases electric ranges have been installed on 30 days' trial; also we will allow the water heaters to be operated two or three months in the summer and then disconnected the balance of the year.

This "Cook by Wire" store is for the sale of electric ranges exclusively and handles no other electric appliance of any kind. A central station opening up a store of this kind certainly proves to the public and the manufacturer, that we believe in the electric range and that we are determined to pioneer the range business.

We realize that we could sell a great many more ranges if we could do considerable more advertising, but the cost of the range is so high that if we added on even a small per cent of the cost of advertising, we find that it brings the cost of the range up so high that we could not sell them on reasonable terms. We are losing money on every range sold in order to introduce the range. If the manufacturers would co-operate and do some national advertising it would help us out tremendously. We believe in the manufacturers creating a demand. We are ready to stand back of the ranges and close the sale, but interest must be aroused before we can start our sale, and the most effective way of getting interest aroused is by advertising. We find hearty co-operation among the local jobbers, most of them spend all their profits made on ranges in helping on various means of advertising and demonstrating. One of the local jobbers paid one-half of the expense of installing a large steel sign 7x17 ft. at a local apartment house where we are installing electric ranges.

Electrical merchants are not as much alive in their lines as the merchants in other lines and do not seem to appreciate the opportunities offered by the electric range.

Electrical contractors and dealers in any city can be a great help in the electric range business. A number of our prospects who decided to install an electric range, at the last minute said they had decided that they would not purchase a range now, as the electrical contractor who wired their house said that the electric range costs too much to operate and advised them not to purchase now, and that they would also like to cook with electricity but that it costs a great deal more than other means of cooking. I find that this is the sentiment of most all electrical men, and this, I believe, is a matter of ignorance on their part. I have one in my home and it costs me 25 cents or 50 cents more than gas, but its advantages are so much greater that I do not even consider that it cost me in the end a cent more than even gas at $1 per 1000. I cook for six in my family and my bill averages $3.50 per month.

When a person desires to buy an electric range or appliance, they generally ask advice of a friend who may be a contractor, dealer, jobber, manufacturer, meter reader, repair man, "wire fuzzer," or an employe of any branch of the electric business, whether this electric appliance he expects to buy is a practical thing for him to use. If this friend "knocks" it, he will not make the purchase, and all effort on the part of the salesman is lost in a second, when some other electrical man "knocks" the electric appliance. We believe in the electric range with our whole heart and soul. We believe it is practical, and we believe we will all be cooking by wire before long and paying 3 cents per kw.-hr, too.

When we first started in the electric range business we made a special canvass of electrical men and architects in the city in order to get them to "cook by wire," so they could recommend the electric range to their friends. We offered all kinds of inducements, giving them the range at cost, wepaying for the installation and letting them pay for the range on their own terms at $2 or $3 per month if they so desired. We sold a half dozen or more and these people are good boosters for the electric range today.

If every electrical man, or even 10 per cent of the electrical men of the country, would cook by wire in their own homes, it would not be long until the other 90 per cent would also be cooking by wire.

The electric range business holds a tremendous future for the central station, manufacturer, jobber,

dealer and contractor. Let's all get together and boost with all our hearts. Buy a range for your own home, give it a trial, and you will see that we can boost the electric range game so that every central station, all contractors and dealers can sell the electric range, like the gas companies, furniture stores, hardware stores, department stores are selling gas, oil, wood and coal ranges today.

We can show the public that electric ranges are as practical as the electric iron, toaster, percolator and other appliances. Every electrical man has waited for the manufacturer to produce a satisfactory and practical electric range. It is here, let's get together and boost.

## AN ELECTRIC APPLIANCE CAMPAIGN WHICH PRODUCED SEVEN-FOLD RETURNS.

Final report of the household appliance campaign conducted by the Northern Idaho & Montana Power Company shows a total of 1444 appliances sold, representing a connected load of 833 kilowatts. The campaign was under the direction of A. F. Douglas, new business manager for the Northern Idaho & Montana Power Company, in conjunction with Mr. Turnbull of the General Electric Company. A crew of four demonstrator-salesmen was employed throughout the campaign, starting at Newport, Washington, April 17 and finishing at Marshfield, Oregon, June 27.

The appliances were sold at a discount of 33 1/3 per cent if purchases were made at the time salesman called, each customer being given one chance to purchase any appliance desired.

The net expense of the campaign was $776, representing the difference between actual traveling expenses and salaries of solicitors, and the sales profit. Estimated annual revenue from the appliances sold amounts to $5,498.40, which is approximately seven times the net expense.

Prior to starting the campaign in any division a list of customers' cards was prepared. Notations were made on the cards by the solicitors as to the number of appliances each customer possessed, special data as to unusual installations, complaints, attitude toward the company, etc. Hand bills announcing that solicitors and demonstrators would call on each customer were distributed in each town a day or so prior to their visit.

Appliances were placed as follows:

| | | | |
|---|---|---|---|
| Sandpoint, Idaho | 229 | Flat irons | 612 |
| Kalispell, Montana | 272 | Table stoves | 698 |
| Dallas, Oregon | 191 | Coffee percolators | 87 |
| Corvallis, Oregon | 210 | Twin glower (heaters) | 11 |
| Albany, Oregon | 162 | Heating pads | 3 |
| Springfield, Oregon | 129 | Water heaters | 4 |
| Marshfield, Oregon | 251 | Ranges | 3 |
| | 1444 | Chafing dishes | 5 |
| | | Curling irons | 2 |
| | | Toasters | 19 |
| | | | 1444 |

Mr. Douglas gives four basic reasons for the success of the campaign, as follows:

1. Introducing the salesmen as demonstrators and stating in all advertising that these men would call at the home and demonstrate the various appliances. This was something new to the customer and gained an appreciative audience.

2. Demonstrators being equipped with good literature and a blue-print book covering all household electric appliances.

3. Demonstrators being fully advised before starting the work as to the proper application of each appliance, the mechanical structure of same, the rate of charge for current, and the cost of operating each appliance.

4. Demonstrators being supplied with customers' cards, and requiring a complete report on 35 customers each day from each salesman.

## LETTERS TO THE EDITOR.

### The Electrical Dealers' Problem.

Sir:—Anent M. L. Scobey's paper on "The Electrical Dealers' Problems," Mr. Max Loewenthal's discussion thereon, and your several editorials on the subject, I am reminded of the old story of the man who built a wall around himself to keep others out, but shut himself in.

All this talk about the sacred domain of the electrical dealer is tommy rot. The electric specialty shop can and should give better service to the buyer of electrical devices for the home than the general department store, the butcher, the baker, or the candle-stick maker. Goods well bought are half sold and an expert electrician knows more in a minute about the good and bad points of an electric iron or washing machine than any general buyer can expect to learn in a year. He should teach his salespeople what he knows himself, but above all else he should learn something about selling methods.

When it comes to selling goods over a counter a good merchant can give cards and spades to the average electrical dealer and still win out. What electrical dealer knows how to write an ad that will sell his stuff? Even if he knows how he lacks the guts to try it.

What would be the harm in having a dealers' section in the electrical contractors' and dealers' association where every hardware man, druggist and department store man would be welcome? The non-electrician could be taught what quality means in electrical apparatus. He would learn that selling shoddy stuff reacts on himself. The electrician could get points on counter selling, window dressing and advertising that would enable him to compete on even terms.

Any discrimination against non-electrical or non-association dealers is a dangerous game. The field for electrical sales during the next ten years is big enough and broad enough to let everybody in. Central stations will be far more likely to co-operate with electrical dealers if they stop this pin-headed policy of trying to hog everything for themselves.

In-breeding keeps the insane asylums full. There are more idiots among the royal families of Europe than in the peasant classes, simply because of this pernicious practice of trying to make a family affair out of the business of ruling the people.

In every business the most successful men are those with the widest knowledge of the general conditions pertaining to their particular specialty.

AMICUS CURIAE.

San Francisco, August 12, 1916.

# ELECTRIC POWER FOR IRRIGATION PUMPING

DEPARTMENT CONDUCTED BY S. T. HARDING

## UNDERGROUND WATERS.

### State and Federal Aid in Development of Underground Water.

Much interest has been aroused in the past five years in the investigations and development of underground water supplies in many of the western states. This has been due to a desire to secure both supplies for field irrigation and also in many cases to secure smaller supplies for domestic and small garden use in general dry farming areas.

California, which is the leading state in the extent of the use of underground water, has continued to develop its resources during this period. Owing to the extensive developments previously made the conditions and possibilities in the state were better understood and the work has been done by private incentive without much governmental assistance. In several of the other states the extent of the underground supplies are not known. This has resulted in a demand for state or federal aid in investigations both of the general occurrence and also in operating experimental plants.

In Utah, according to L. M. Winsor of the Agricultural Experiment Station, such investigations have been in progress for the 2½ years. There have been no special appropriations but the government and state agricultural college have furnished the supervision while the state conservation commission has supplied some funds for the operation of three pumping plants. The water developed is used for irrigation and careful records are kept as to results obtained by the application of water on the desert soils. These plants were installed on a co-operative basis, one deep well was sunk by the state land board, the other two were dug by farmers in the immediate vicinity. The pumping plants were furnished for use by one of the machinery companies, one of the railroads supplied transportation and seed and an oil company gave all fuel and lubricant used in the three plants. It is hoped that the work will grow in importance until the legislature will give it direct support. Much interest in underground water development has been aroused and the various machinery, houses and power companies are active in its encouragement.

In Kansas a state fund of $40,000 is available for the installation of pumping plants. Before any of this fund can be expended in any county, however, it is necessary for the counties to donate the land for the plant. One gas engine and 3 wind mill plants have been installed. These are stated by Mr. H. B. Walker, state drainage and irrigation engineer, not to have been successful. This is not due entirely to the failure of pumping for irrigation in Kansas, but to ignorance in the construction of the plant. No additional plants are now being installed although a part of the state fund remains available. Assistance of an advisory nature is given by the state agricultural college to individuals or companies planning pumping plants. Where visits are made the services are given free, those asking for the assistance being required to pay the actual travelling expenses incurred in making the visit.

The Nevada legislature in 1915 provided for a department of engineering experimentation in connection with the agricultural experiment station. One of the duties of this department is to aid in the development of the underground waters of the state. An appropriation of $5000 was made. It is provided in the law that anyone desiring expert advice as to location of wells, methods of developing underground water and character of machinery can apply to this department and if it is considered advisable by the head of the department, an examination can be made, the expenses to be paid from this fund. The commissioner of the Bureau of Industry, Agriculture and Irrigation has issued a bulletion on "Irrigation Pumping in Nevada," giving data on the location, construction and use of pumping plants.

Much attention has been given to pumping for irrigation in New Mexico and Arizona. In Arizona the legislature has appropriated $2500 for 1915 and 1916 for investigations of underflow in the several counties of the state. The Agricultural Experiment Station has published a bulletin (No. 74) on "Oil Engines for Pump Irrigation and Cost of Pumping," which gives much information on the use of the lower grade oils. A bulletin has also been published on "The Ground Waters in the Rillito Valley."

In New Mexico an appropriation of $1500 has been made for investigation and construction of wells on state lands, the cost of which are to be added to the land when sold. The Agricultural Experiment Station has also been active in investigations of the efficiency of centrifugal pumps, and has issued bulletins on these tests and on small plants.

In other states much interest has been taken in the development of ground water but has not reached the stage of definite state aid as yet. Much pumping for irrigation is now practiced in Washington, Idaho, Montana and other states, but consists largely of relatively large units pumping from surface supplies.

The United States Geological Survey has also been active in investigations of underground waters. Since 1903 there has been a separate division for underground waters. Ground water conditions in many localities have been studied and bulletins, included in the general series of water supply papers, published. These include some on parts of every western state, the total being over 50. In California alone 15 water supply papers dealing with ground waters in the more important portions of the state have been issued and others are being prepared. The list of publications of the U. S. Geological Survey issued from time to time gives the titles of all such bulletins. Besides the geology and occurrence of ground water much information regarding its use is included in some cases.

These various instances have been cited to show the very general and widespread interest in the subject. The investigation of general ground water conditions in a locality is beyond the means and knowledge

of those planning individual developments and is properly a subject for state or federal investigations. With the increasing difficulty of extending gravity supplies and the improvement in pumping equipment with its consequent reduction in the cost of pumping, continued development of ground waters is to be expected. In some localities where the occurrence and extent of ground water supplies are untested there may be a legitimate field for governmental aid in the actual operation of experimental plants. Where development has already taken place there is the same need of investigations of the extent of the supply as there is for the measurement of surface streams, although the conditions for estimating replenishment are not such as to permit of similar assurance in the accuracy of the results. It is now realized that the draft from ground water must be limited to the average rate of replenishment if the water table is to be maintained. Studies of such replenishment can best be made by other state or federal organizations as the results are of benefit to all.

Such studies for an area could well be repeated from time to time just as records of surface streams are continued from year to year. The effect of development and pumping on the water table furnishes the best basis for the study of the available supply. As the extent of such development changes, additional information becomes available from which the estimates of earlier years may be confirmed or corrected in the light of the later experience.

### Storage and Underground Waters as an Aid to Gravity Flow.

The relative advantages of storage or pumping from wells for supplies to supplement direct gravity diversions from streams are discussed by Mr. W. H. Code in the recently issued volume on Waterways and Irrigation of the International Engineering Congress, 1915. The conditions in three valleys are cited.

In the Salt River Valley in 1900 the flow of the Salt River was unusually low and the loss of both crops and alfalfa stand was sufficient to fully arouse all classes. The resulting activity led to the construction of the Roosevelt dam to supply storage water. Investigations and test pumping plants were also installed to determine whether auxiliary supplies could be secured from the ground water. These were successful in developing water. Mr. Code is not aware of any other instances where so great an area of land has been threatened with a loss of crop while under it were located underground reservoirs of water sufficient to supply the adequate supplemental water supply needed.

Similar conditions on the Pima Indian Reservation in the Gila River Valley in 1902 led to the installation of the initial Sacaton pumping plant and the drilling of many test wells. The results were such that ten electrically-operated centrifugal pumping plants were installed to supplement the supply of the gravity canals. There has been more or less agitation concerning the construction of a storage reservoir on the Gila River, but such works require years for completion. In the meantime, great areas of land must remain in a desert condition; and this land could be cared for if low concrete diversion dams were constructed across the river at points along the stream above lands previously demonstrated by actual experiment (as the Sacaton) to have underground reservoirs of water which could be drawn upon by pumping and thus reinforce the gravity supply of river flood waters. All such pumping works would be needed even in event storage reservoirs should be built at a later date. The territory proposed to be covered by this combined system should be tested thoroughly by drilling wells at different points and carrying on pumping tests at every well to determine the lift, quantity, character, and probable permanence of the underground supply. It is especially important that frequent analyses be made of the pumped water in order to determine its chemical constituents.

A third system on the lower Kings River in California is mentioned where the plan proposed is a gravity canal supplemented by pumping from deep wells. The above instances were cited to emphasize the importance of underground water development as an auxiliary supply to flood water irrigation. There are many streams in the West where irrigation has been limited to the area that can be irrigated successfully by the stream flow existing during the major portion of the irrigation season. The flood flows of these streams, however, may last for only two or three months of the irrigation period, and could be used most advantageously if pumping plants were installed on the lands bordering the stream, to supplement the gravity supply.

### Comparative Costs of Deliveries.

A comparison of the cost of wood and concrete structures on the system of Imperial Water Company No. 3 is given in their recently issued report for 1915. The comparative costs of similar structures are given in the following table:

| Structure. | Timber, 1 in. material, built in 1914. | Timber 2 in. material—improved design—1916. | Concrete |
|---|---|---|---|
| Deliveries ..... | $27.80 | .. | $22 |
| Checks ..... | 89.24 | $60 | 55 |
| 2-foot drops .... | ..... | .. | 45 |
| 3-foot drops .... | 145.57 | .. | 50 |
| 4-foot drops .... | 155.37 | .. | 60 |
| 5-foot drops .... | 167.74 | .. | 70 |
| 6-foot drops .... | 183.34 | .. | 80 |

It is stated that in a recent examination of some timber structures, built two and a half years ago, it was found that the wood at the ground line of many structures was in a badly rotted state. It is reasonable to believe that this life will be only 2, 3 or 4 years more and that replacement will then be required.

### Duty of Water.

The variation in the quantity of water used on adjacent farms is brought out in an article by F. M. Cronholm before the Fifth Annual Conference of Operating Engineers held at Boise, Idaho, in February, 1916. The figures were secured from the hydrometric records on the Minidoka project. Under the pumping unit on similar soils, the quantity of water used on different farms varied between 80 and 163 per cent of the mean. In sections having lighter soils variations as high as 420 per cent were found in one section where the minimum use was 1.0 acre feet per acre and the maximum 5.2 acre feet.

# SPARKS—CURRENT FACTS, FIGURES AND FANCY

The best over-all efficiency obtainable in modern electric light generation from "crude petroleum to light" is about 1 per cent. Scientists tell us that the lightning bug generates his light at 98 per cent efficiency.

* * *

But as some "classic poet" has said:

"The lightning bug is brilliant,
But he hasn't any mind.
He blunders through existence
With his head lights on behind."

* * *

Moral: Keep your head-lights to the front.

* * *

Great business activity is expected in Germany after the war, so state the consular reports, and the question is being discussed in the Brunswick press as to the advantages of having special compartments in the cars of express trains for business men.

* * *

A municipal loan of the city of Rotterdam of $2,400,000 at 4½ per cent was recently oversubscribed twenty times. There is an abundance of money in the Netherlands.

* * *

The cost of the eight to ten million shells used at Verdun is estimated at $300,000,000. Mining in France ought to be a productive industry after the war.

* * *

A Ford car operating in the Grand Valley for the U. S. Reclamation Service that travelled 14,200 miles, is said to have cost 15.6 cents per mile when all expenses of operation, repairs and deprecitaion are taken into account. What must be the bottom story for total costs of operation of the higher priced machines?

* * *

The United States Bureau of Fisheries hatched 128,700,000 lobsters in Maine and Massachusetts during the past year. We wonder who furnished the supply for the other states of the Union.

* * *

Statistics show that one may travel on electric cars in many American cities a total distance of fifteen miles for only five cents.

* * *

A nation-wide investigation has been started among electrical manufacturers and distributers covering accounting, cost-keeping and business methods of contractors, manufacturers, jobbers and dealers in order that there may be ascertained the exact cost of doing business in manufacturing, in jobbing and in retailing electrical goods.

* * *

An eastern electrically equipped cold storage plant recently saved $25,000 worth of cold storage eggs due to a break down of a gas engine in a neighboring cold storage plant. Better do it electrically in the future.

* * *

There are over thirty-two thousand students enrolled in engineering colleges throughout the United States.

* * *

Apply prussian blue to a light bulb as far down as is necessary to prevent direct glare of the light from shining in the eyes and it will be found much more comfortable for the workman.

* * *

Because Diesel engines frequently use pressures up to 700 or 800 lb. per square inch many scent danger in their use. The fact remains, however, that the engines suffer more from the increased temperatures resulting from such pressures than from the pressures themselves.

* * *

The longest high voltage, heavy current submarine cable in the world is that extending from the Lagan power house in Sweden to North Suland in Denmark, across the Oresund. This cable is 3.4 miles long, operates normally at 35,000 volts and was tested to 87,500 volts. During the first six months of operation only about 370 kw. has been transmitted as the war has delayed building up the load at Suland.

* * *

China imports nearly two hundred million gallons of kerosene a year. This is a half gallon per Chinaman. They must be hard drinkers.

* * *

The Canadian grain crop prospects for the season of 1916 indicate a crop around two hundred million bushels. Offers of transportation and good wages to 75,000 American workmen are being made to handle this bumper crop.

* * *

The development of two million horsepower of electric energy below the Niagara Falls without disturbing the Horseshoe and American Falls, and the expenditure of $100,000,000 in the work, are proposed in a scheme submitted to the Dominion Government for approval.

* * *

The editor of Engineering and Contracting has figured the waste of the 3,000,000 horsepower at Niagara, left unharnessed for sight seeing purposes, costs the public $150 per look, based on the number of visitors that annually view this nature wonder and the commercial value of the water passing over its undisturbed natural course.

* * *

Should we pause to divide the economic value of the Hetch Hetchy for water storage purposes by the number of visitors that have ever seen that national reserve, we could take the income and all retire for life.

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POWER AND GAS

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NOTICE TO ADVERTISERS.

Change of advertising copy should reach this office ten days in advance of date of issue. New advertisements will be accepted up to noon Monday dated Saturday of the same week. Where proof is to be returned for approval, Eastern advertisers should mail copy at least thirty days in advance of date of issue.

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**Wanted—A Labor Arbiter**

Like a boil on the body politic, this week's crisis in the railway strike situation is merely a symptom of a more serious national disorder. Labor leaders are blamed for arbitrarily refusing to arbitrate, yet a properly constituted arbiter has not been provided. When mediation fails it is time for Congress to act.

That sporadic and endemic labor troubles have become epidemic is due to lack of means for adequate control. The machine needs new parts to perform new functions. Some regularly established system such as the municipal, state and federal courts, is necessary to insure justice to both sides in any dispute, as well as to protect the general public welfare. Whether these duties can best be undertaken by an augmented Department of Commerce and Labor or by an entirely new body is a question for early determination.

Meanwhile would not compromise be wise? Let each side yield a point until the merits of the entire matter can be decided. Should the employes' demands prove justifiable, then let the Interstate Commerce Commission make sufficient increase in passenger and freight rates to meet any deficit which the railways may face.

Labor difficulties, whether the national ones of the railways, the state troubles of the power companies, or the local disputes of culinary workers, require a broad-minded attitude for their solution. To engender class hatred and dynamite outrages is merely to add fuel to the fire. Labor and capital alike should be inspired by a common loyalty to the country, a willingness to arbitrate differences of opinion and a tolerance of opposing views.

The immediate answer to the present difficulties may work itself out temporarily even before these lines are read. But the lasting solution now seems to require a firm control of the situation in order to obviate the anarchy which inevitably ensues when constituted authority is ignored.

---

**"Cooking By Wire"**

The livest topic of the hour among the various members of the electrical fraternity is "cooking by wire."

The time has come when timid conservatism must be thrown aside and every effort made to educate the householder in the uses and economies of electric cooking. Too many of us are ourselves still in the doubting Thomas class to be of valuable assistance in boosting this campaign of education.

What really happens in a majority of cases in which a householder is approached on the subject of electric cooking is that the householder goes at once to an acquaintance who supposedly has some knowledge of electrical matters and asks his advice. If the electrical friend is ill-advised on recent advances in electric cooking appliances the sale is as a consequence not made. The electrical fraternity is itself vastly

ignorant of the recent improvements in electrical cooking devices and indeed ignorant of the economies and conveniences to be acquired under the low rates that have been established by the great power companies serving various communities of the West.

The remedy lies in first promoting a thorough and all sweeping campaign of education among the electrical men themselves. On another page of this issue is detailed an inspiring description of how opposition among electrical men has been overcome at Portland by an educational campaign among the contractors, architects, electricians, electrical employes and householders.

If the electrical fraternity is going to champion this new field of electrical profit let them all get abreast and primed to the muzzle with an enthusiasm based on sound facts, let them press forward in this productive and fruitful campaign of further utilization of electrical energy. Let none of us be like the captain who heroically issued the command, "men, strike for your country and for your home," and while they were striking for their country he struck for home.

---

**Reorganization Abuses**

Reorganization is today the rule rather than the exception with public utility corporations. Every locality can supply its example of an insolvent utility where reorganization appears to be the only remedy whereby the obligation to serve the public can be maintained. Whether this financial embarrassment be due to criminal inflation of securities or incompetent management of properties is, for the moment, not relevant. The ship has been wrecked and must be salvaged.

To the rescue come the wreckers, the reorganizers, men legitimately employed to save some value for the owners. They may bring about an equitable reorganization where the manifest rights of all are recognized and the present unfortunate security holders suffer a minimum for the mistakes and misdeeds of others. Or they may proceed ruthlessly, riding roughshod over prior rights and even conniving at the chance to legally plunder the victims of the wreck.

This last class is regrettably much in present vogue. All that is necessary is a coterie of conscienceless financeers, a cluster of callous lawyers, a complacent judge and a pack of parasites. As the courts of justice are unable to assume the management of all involved corporations, the outraged security-holders learn, too late, that they cannot get court redress until they have exhausted all the remedies within the corporation. The ordinary bondholder, in such cases, is defenseless. If he goes in, he is squeezed. If he stays out he is ignored. His money is treated as captured capital, to be so manipulated that he gets as little as is technically possible to grant. Meanwhile the man-vultures gorge themselves on the financial corpse.

Without positive proof susceptible of satisfactory citation in case of libel suit it is unwise to more than guardedly refer in an impersonal way to the pernicious practices of self-appointed reorganizing committees intoxicated by temporary access to other people's money. The case is purposely understated. The facts as locally developed would justify far stronger language.

In this is no sympathy for the investor who in ignorance or defiance of developed depravity in high places has put his or her money in jeopardy by foolishly "investing" in promises to pay. "Caveat emptor." Where the buyer did not beware, believing in the good faith and business honesty of those who were or might be manipulating the game, he should not whine or complain. It probably serves him right for such exercise of misplaced credulity.

The one purpose in thus noticing the predatory pack who chase crippled corporations is to give warning that their criminal proclivities are becoming thoroughly understood by their individual victims and that purely as a business proposition it were well to go slow. Confiscation of funds and retention of loot can not long continue. The impotence of the victims is vexatious—to them—and this vexation must react on the plunderers. Simply from the standpoint of personal gain. reckoning one year with another, these pirates would make more in the long run by leaving some of the swag. Some encouragement should be left to the disappearing species of money savers, otherwise the professional wolves may have to turn and rend each other,—a custom which is not considered good form in such financial circles.

To write further on this phase of reorganization would be unnecessary to those who can understand it—and useless to those who can not. Suffice it to suggest that incompetency of management and corruption of reorganization here plays each into the hand of the other.

Would that more of these "reorganizers" were honorable beyond the limits of an honesty sufficient to keep them out of jail! Would that they were gifted with imagination to see how finely and fairly their experienced brains might be used to conserve the captured capital for its owners and meanwhile turn an honest penny for themselves, keeping out of that twilight zone bounded by shrewd dealing on the one side and by plain swindling on the other! There do exist men of probity, honor and intelligence among the reorganizing committees who should rise to the opportunity to check this epidemic of criminal folly. These men of integrity can and should be the leaders in this period of reconstruction. They can be the means of saving the "reorganizer" from infamy. This is the chance that awaits the men that have been called in to preserve the United Railroads of San Francisco from the effects of public ill-will. These men undertake a difficult task, but as they have the respect and confidence of the community, they are likely to succeed in bringing order out of chaos.

# PERSONALS

**F. G. Baum**, consulting engineer, has returned to San Francisco from the East.

**E. A. Wilcox,** electrical heating specialist, Great Western Power Company, is at Lake Tahoe.

**T. E. Bibbins,** president Pacific States Electric Company, has returned to San Francisco from Portland.

**C. G. A. Baker,** vice-president and treasurer Baker-Joslyn Company, has returned to San Francisco from Seattle.

**J. H. Knost,** salesman with El Paso office Westinghouse Electric & Manufacturing Company, is at San Francisco.

**Fred Wilson,** representative Standard Underground Cable Company, at Salt Lake City, has returned to Utah from a vacation trip to California.

**H. Brewster Hall,** Pacific Coast manager Pass & Seymour, Inc., has returned to San Francisco from an extended auto trip through Southern California.

**Al. Younghoim** of the Electric Railway & Mfrs. Supply Company, has returned to San Francisco from a week in Sonoma county, Cal.

**Warren Murray,** chief engineer Western Sugar Refining Company, has returned to San Francisco from a two months' eastern trip.

**Leland S. Rosener,** consulting electrical engineer, left San Francisco this week for the East in the interest of several clients.

**C. G. Gauntlett,** Pacific Coast manager Safety Insulated Wire & Cable Company, is spending his vacation in the Sierras.

**M. F. Steel.** salesman with Benjamin Electric Manufacturing Company, is in Arizona en route to the company's Chicago factory.

**D. C. Pence,** formerly connected with Julius Andre Sons Co., Milwaukee, has joined the sales forces of the Illinois Electric Company, Los Angeles.

**W. M. Shepard,** commercial manager California-Oregon Power Company, has returned to San Francisco from Los Angeles.

**L. F. Harza,** formerly consulting engineer at Portland, is now chief engineer for the Great Lakes Power Company, Sault Ste. Marie, Ontario, Canada, for whom he is installing a 20,000 h.p. development.

**A. S. Kalenborn,** electrical engineer, San Joaquin Light & Power Corporation, having finished the installation of a new steam plant at Betteravia, California, is spending a couple of weeks in the San Francisco bay region.

**Franck Lane,** a graduate with the first class in electrical engineering from the University of Santa Clara, has left San Francisco to take up the Westinghouse Electric & Manufacturing Company's student engineering course.

**Reginald Duden,** representing R. J. Davis, selling agent for Century fans and motors, is making a trip through Central California, and **Paul A. Shilton,** Los Angeles manager, has been making an extended trip through Southern California.

**R. F. Behan,** assistant manager San Francisco office Westinghouse Electric & Manufacturing Company, was instrumental in having the Shields Bill for waterpower development on navigable streams endorsed by the San Francisco Chamber of Commerce.

**C. D. Marx,** professor of civil engineering at Stanford University, is chairman of the waterpower committee which has just been appointed by the Commonwealth Club of San Francisco, and **H. E. Linden**, hydroelectric engineer, is secretary. The other members of the committee are **F. G. Baum,** consulting engineer, **A. E. Chandler** and **W. R. Johnstone** of the State Water Commission; **Frank R. Devlin,** commissioner and **Paul A. Sinsheimer,** bond expert of the California Railroad Commission; **A. H. Halloran,** managing editor Journal of Electricity; **H. Clyde Harms,** attorney-at-law; **W. F. McClure,** state engineer, and **M. M. O'Shaughnessy,** city engineer at San Francisco.

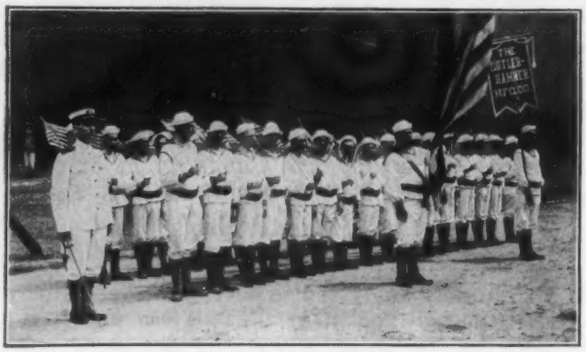
## TRADE NOTES.

Montana Power Company, Holter Junction, Mont., have ordered from Westinghouse Electric & Manufacturing Company for their new Holter hydroelectric development (capacity 48,000 k.v.a., 3-phase, 60 cycle, 6600 volts), one 7 panel, one 6 panel, and three 5 panel switchboards, eleven type E-6, and seven 110,000 volt type GA oil circuit breakers.

The Westinghouse Lamp Company of New York has started a little publication entitled "How—I—did—it." Each month for the best story contributed on sales campaigns fifteen dollars will be given, ten dollars for the next best, and two dollars for all other stories accepted for publication. The matter is purely educational and in no way is the publication confined to the Westinghouse organization.

## CUTLER-HAMMER EMPLOYES IN MILWAUKEE PREPAREDNESS PARADE.

The well known spirit of the Cutler-Hammer organization was much in evidence July 15th when Milwaukee's Preparedness Parade took place. Miles of people, more than



Cutler-Hammer Marines in Preparedness Parade.

30,000 in all, marched in the parade. The Cutler-Hammer marchers were strung over a distance covering several city blocks, the number in line reaching about 1300. This large number or a total of 1600 employes is strong proof of the family spirit existing in the Cutler-Hammer ranks. "Each for all" is the C-H motto.

## CALIFORNIA WATER COMMISSION NOTES.

M. F. Tarpey, E. R. Reed, J. W. Beall and George E. Rice of Fresno county and Charles King of Kings county, as trustees for an irrigation district or districts, have filed an application with the commission for permission to appropriate twenty thousand cubic feet per second of the waters of Kings River in Fresno county for the irrigation of lands in Fresno, Tulare and Kings counties. A proposed dam for storage of 600,000 acre feet of water is given as 300 ft. high. 1200 ft. long on top and 213 ft. on bottom, concrete construction, with waste-way over dam. Existing canals in the region now taking water from Kings River, are proposed to be used, as well as others to be constructed. The name of the district is to be The Pine Flat Reservoir District, and the application states that it is to be organized after the completion of surveys. Construction work is to be completed two

years after commencement and the water completely applied to the land two years after that. The total amount of land to be irrigated has an area of 1,200,000 acres.

The Western Development Company of San Francisco has applied to the commission for permission to appropriate 2½ cubic feet per second of the waters of the South Branch of Oregon House Creek tributary to Dry Creek in Yuba county for irrigation purposes. By a dam of timber, rock and brush, applicants intend to divert the water to 90 acres of land at a cost of $500. The works are to be known as the Meadow Lawn Stock Farm Ditch.

Emery Hunt of Oregon House, Yuba county, has applied to the commission for permission to appropriate three cubic feet of water per second from Oregon House Creek in that county for the purposes of irrigation. At a cost of $400 for works, applicant intends to water 100 acres.

David S. Jones of Sweetwater, Mineral county, Nevada has applied to the commission for permission to appropriate three cubic feet per second from Robinson Creek, tributary to E. Walker River in Mono county, for agricultural purposes.

Francis M. Carter, of Palliser, San Bernardino County, has applied to the commission for permission to appropriate the flood and surface waters of Swartout Canyon and Sheep Creek, in that county, for agricultural purposes to the extent of six cubic feet per second.

C. Roy Smith of Los Angeles has applied to the commission for permission to appropriate 25 cubic feet per second of a lagoon in Riverside county, tributary to the Colorado River. The main ditch of the proposed works is to be two miles long, fed by a pumping plant, the system to cost $25,000, and to irrigate 3040 acres.

Earl L. Laib, John P. Burke of Los Angeles, Chas. Dollon, A. Camarillo, Jos. D. McGrath, John Lagomarsino and Jas. P. McLaughlin of Ventura, have applied to the commission for permission to appropriate thirty-one cubic feet per second of the waters of Duck Lake, Desolation Lake, Lake Muriel and unnamed lakes, tributary to the San Joaquin River in Fresno county. It is intended to make reservoirs of two of the lakes, storing 3800 acre feet of water and conveying same by means of tunnels and iron flume pipe to 2160 acres to be irrigated at an estimated cost of $30,000.

The Loaldo Lands Company of Pasadena, has applied to the commission for permission to appropriate 7½ second feet of Zaca Creek for irrigation. Complete surveys will give further information in regard to the works.

Louisa S. Paulson of Lewiston, Trinity County, has applied to the commission for permission to appropriate thirty cubic feet per second of Rush Creek, tributary to the Trinity River in that county for hydraulic mining purposes. The water will be conveyed from point of diversion to place of use by a pipe line 6.6 miles in length.

Edwin Heusser and Julius Bosshard of Pomona have applied to the commission for permission to appropriate three second feet of the waters of Cottonwood Creek in the Antelope Valley. The water at present loses itself in the gravels of the valley and the applicants intend to bring it on 57½ acres for agricultural purposes, at an estimated cost of $300.

The New England-California Corporation, by W. E. Vandiveer, superintendent, has applied to the commission for permission to appropriate 3.56 second feet of the waters of Stanislaus River for purposes of irrigation on its lands near Ripon, San Joaquin county. The water will be diverted from the river by means of a 25 h.p. electric motor, connected to an 8 in. pump of 1600 gallons per minute capacity. The estimated cost of the plant, and 2¼ miles of ditches is $1200.

## PROGRAM OF N. W. E. L. & P. A.

### Wednesday, Sept. 6.

Morning Session, 10 o'clock.

Call to order; Address of Welcome, Mayor H. C. Gill; Response by N. W. Brockett, P. S. T. L. & P. Co.; Address of President E. G. Robinson.

Afternoon Session at 2 o'clock.

Paper: Application of Overhead Line Construction Rules of the Public Service Commissions of the Northwest, by M. T. Crawford, P. S. T. L. & P. Co; Paper: Effect of Obsolescence of Equipment on the Cost of Service, by Leslie Craven, P. Ry. Lt. & P. Co.

### Thursday, Sept. 7.

Morning Session at 9:30 o'clock.

Paper: The Employe as an Educator of the Public, by Arthur Gunn, W. V. G. & E. C., Wenatchee; Paper: Merchandising and Operating in Small Towns and Rural Communities, by Lewis McArthur, of the P. P. & L. Co., and W. F. Farquhar, W. W. P. Co.

Afternoon Session at 2 o'clock.

Electric Range Committee report, by W. R. Putnam chairman. Special features of the report will be discussed by H. J. Gille, Advertising; M. C. Osborne, Rates; J. F. Derge and S. M. Kennedy, Merchandising; S. V. Walton and A. M. McMicken, Water Heating.

### Friday, Sept. 8.

Morning session at 9:30 o'clock.

Paper: Standardization, by M. D. Cooper, Engineering Department, National Lamp Works, General Electric Company of Cleveland, Ohio; Round Table Conference conducted by President E. G. Robinson. Discussion will be conducted as follows: Commercial—All Questions—M. C. Osborne; Legal—All Questions—N. N. Brockett; Operation—Question 1, L. T. Merwin; Question 2, M. T. Crawford; Questions 3-6, J. B. Fiskin; Questions 5-6, J. C. Martin; Question 7, Arthur Gunn.

Afternoon Session at 2 o'clock.

Address, A Greater Jovianism, Arthur H. Halloran, Editor Journal of Electricity, Power & Gas, San Francisco; Paper: Co-operation Between Central Stations, Manufacturers, Jobbers, Contractors, Dealers, by W. L. Goodwin, vice-president Pacific States Electric Company, San Francisco, Cal.; executive session; election of officers; adjournment of business sessions.

## BOOK REVIEW

**Electric Heating.** By E. A. Wilcox, E. E.; 5x8 in.; 292 pp.; replete with illustrations. Published by the Technical Publishing Company of San Francisco, and for sale by Technical Book Shop, San Francisco. Price $2.50.

The utilization of electric energy for cooking purposes is the campaign of the hour among central station managers. Here is a book written by the electric heating specialist for the Great Western Power Company, which sets forth in a practical way the many uses to which electric heat may be applied, not only for electric cooking but also for the whole range of electric heat applications. The author discusses in a clear, concise manner the relative desirability of various kinds of heating loads from the central station point of view and also from that of the consumer. Relative operating costs of electric and fuel-heated apparatus are shown by tables and simple calculations. Hitherto little information of a practical nature has been available for equipping power salesmen with the necessary data to drive home his arguments on the relative advantages of electric heating in all its various applications. The book is timely and should secure an immediate and favorable recognition from all quarters where active campaigns are being put forth for new electric heating loads.

# NEWS NOTES

## INCORPORATIONS.

KINGMAN, ARIZ.—The Wallapai Lighting & Power Company has been incorporated with a capital of $50,000. The officers are: Robert Roe, president; A. Fay, vice-president; A. L. Cox, secretary; R. C. Van Denberg, treasurer. The new company has taken over a small lighting plant installed by Mr. Roe.

SALEM, ORE.—With a capital of $17,000,000, the Idaho Power Company of Augusta Maine, recently filed with Corporation Commissioner Schulderman its declaration of intention of engaging in business in the state. It was organized May 6, 1915. C. M. Hamilton and E. P. Summerson of New York are the president and secretary, and John A. Laing of Portland has been named general agent for the company in Oregon.

WEISER, IDAHO.—A union of the large hydroelectric interests of the southern and western part of the state from Blackfoot to Huntington has been made in a big merger, perfected in the organization of the Idaho Power Company with a capital of $17,000,000. Merged into the Idaho Power Company are the Idaho-Oregon Light & Power Company, the Idaho Railway, Light & Power Company, the Great Shoshone & Twin Falls Water Power Company, the Idaho Power & Light Company, the Southern Idaho Water Power Company, with other small properties. F. F. Johnson of Boise is president of the new corporation and Wm. T. Wallace vice-president.

## TRANSMISSION.

DUNSMUIR, CAL.—The California-Oregon Power Company is making arrangements to extend its service from Sisson to McCloud.

YOSEMITE, CAL.—About $250,000 will be spent this year in Yosemite. The chief work will be the erection of a 750-horsepower electrical plant to cost $100,000.

TAYLORSVILLE, CAL.—The Plumas Light & Power Company will extend its lines here from a tap on the Great Western Power Company's lines. The Plumas Company reports a 50 per cent gross increase in business during June, July and August.

REDDING, CAL.—The Green Horn Copper Company, controlled by San Francisco people, has arranged to have the mine machinery electrically operated, the power being drawn from the Crystal Creek plant near French Gulch. Construction of the new power line has begun.

## TRANSPORTATION.

WHITTIER, CAL.—The Pacific Electric Railway Company has been granted a franchise to operate and maintain

GARDNERVILLE, NEV.—Fire has completely destroyed the electric power plant at the Fritz Dressler farm near Fairview. The electric dynamo, cream separators and dairy equipment were destroyed.

tracks on Philadelphia street and Greenleaf avenue.

HONOLULU, T. H.—Extension of the lines of the Honolulu Rapid Transit & Land Company to Fort Shafter will be made as soon as the plans are approved by the superintendent of public works. Double-tracking of King street and of Kalakana avenue will be started soon.

REDLANDS, CAL.—With the construction in the near future of a new bridge over Santa Ana River and the overhauling of the San Bernardino-Redlands line, Redlands will have through service over the Pacific Electric to Los Angeles. The proposed bridge, upon which construction work will start soon, will cost more than $30,000.

LINDSAY, CAL.—The Visalia Electric Railroad will soon begin work at the El Mirador end of the proposed line and continue northward toward Lindsay and thence to the junction point with the Southern Pacific Railroad near the Randolph packing house. The route by which Lindsay will be entered is now under consideration.

LORDSBURG, N. M.—It is reported that the Carlisle Mining Company, under the ownership of New York and other eastern capitalists, is to construct an electric railroad from Duncan, Ariz., to their mines in Steeplerock district. An electric plant will be erected in the near future by the company, either at Duncan or somewhere on the San Francisco River, which flows through property of the company.

MISSOULA, MONT.—By the first of November, 1916, it is expected that steam engines will be superseded over the entire distance of 440 miles from Harlowton, Montana, to Avery, Idaho, on the transcontinental lines of the Chicago, Milwaukee & St. Paul. Electric trains are now running over a large part of this distance. The unique feature of the installation is that electric power is generated on the down grades thus eliminating difficulties incident to the use of air brakes in addition to a saving of a possible fifteen per cent in operating power.

EVERETT, WASH.—The report of Engineer Robert Hewes of Seattle, who was engaged by the city commissioners to investigate the power possibilities of the Sultana river, has been made to the commissioners. An enormous amount of power can be developed, the full amount will not be needed in the city for years, and the engineer has figured that the plant can be built a unit at a time. The plans drawn by the engineer contemplate the construction of but one large dam to store the water whereas previously drawn plans have included the erection of several dams. The engineer estimates the cost to develop 72 500 h.p. at $6,127,000.

## ILLUMINATION.

FRESNO, CAL.—At the next session of the supervisors bids will be received for lighting the court house park. The electrolier system will be similar to one installed by the city.

NEWPORT, CAL.—The state board of control has offered to buy three more of the city gas bonds at par. The city will sell the bonds and use the money for extension of gas mains.

SPOKANE, WASH.—The extension of the Riverside high power lighting system from Washington street to Cedar is being asked for in a petition by property owners. The cost of the improvement will be about $60,000.

ENTERPRISE, ORE.—The Joseph Light & Power Company was purchased recently by the Enterprise Electric Company, thus completing the merger of all the electric plants in Wallowa county under one ownership and management.

VANCOUVER, B. C.—At a recent meeting of the civic fire and police committee the question of the installation of ornamental street lights past the Hudson's Bay stores on the one side of Georgia street, from Granville to Richards street, was taken into consideration.

EVERETT, WASH.—The Everett Gas Company has secured a contract with the Monroe Water Company to furnish electricity for pumping Monroe's water supply. The contract is for five years and will mean an increased revenue to the Everett company of approximately $3000 annually.

SPOKANE, WASH.—C. A. Coffin, who procured the 35 year light and water franchise at Northport, has returned to this city to complete the purchase of equipment. Mr. Coffin

estimates the cost of installation to be about $50,000. Construction wil begin as soon as the equipment is obtained.

YUMA, ARIZ.—The Title Insurance & Trust Company of Los Angeles, Cal., as trustee, has taken possession of the properties of the Yuma Electric & Water Company, in accordance with a deed of trust. The same company has also taken possession of the properties of the Yuma Gas Company, in accordance with a deed of trust executed on the same date.

## TELEPHONE AND TELEGRAPH.

MARSHFIELD, ORE.—A wireless station will probably be built at the site near Englewood during the fall.

MADERA, CAL.—Residents of Oakhurst are planning to extend their telephone line from Coarse Gold, the remaining 23 miles to Madera.

KINGMAN, ARIZ.—The supervisors of Mohave county have granted Anson H. Smith a franchise to operate telephone lines over county highways.

BRAWLEY, CAL.—A telephone line will be built this fall from Dixieland to Jacumba if plans now under way in Imperial and El Centro are carried out.

BLYTHE, CAL.—The Southern California Railroad Company has been granted a franchise to operate telephone and telegraph lines on Riverside county highways, the company being the highest bidder at $75.

RICHMOND, CAL.—The Pacific States Telephone Company is spending $5000 in extending its system, so as to accommodate the plant of the General Roofing Manufacturing Company and the territory adjacent.

VENICE, CAL.—Four new telephone lines are to be put in by the Home Telephone Company between Los Angeles and the Santa Monica bay district at a cost of $10,000. Work on the new lines will probably be completed within two weeks.

CLOVIS, N. M.—Effort is being made to raise funds to install a phone line to terminte at Bellview, N. M., 40 miles from here. The plans provide for a main line direct to Bellview, from which spur lines will run, touching other points in the northern part of the county. The cost will be about $50,000.

PORTLAND, ORE.—Francis H. Crosby of San Francisco, purchaser of the stocks and bonds of the Northwestern Long Distance Telephone & Telegraph Company, has been permitted in the Federal Court to extend his notes for $240,000 to the American Telephone & Telegraph Company from January 1, 1917, to January 1, 1919, his petition for this privilege having been approved. Crosby based his petition on the delay of several matters connected with his taking over the properties due to litigation. He was permitted by the courts some time ago to take over the property for $300,000, $60,000 of which was in cash.

## IRRIGATION.

WILLOWS, CAL.—A. Henning has applied for permission to take water out of the Sacramento River for irrigation purposes. He will erect a pumping plant to irrigate 200 acres.

OAKDALE, CAL.—The Oakdale Irrigation District is considering the damming of the Stanislaus River below the town of Melones and just above the Goodwin dam where the water of the two districts is now impounded.

SACRAMENTO, CAL.—The Consumers Irrigation District now in the process of organization will in all probability be extended on the north side of the Consumnes River to include a large area of rich land near Sheldon. The district will contain over 40,000 acres.

SACRAMENTO, CAL.—The validity of the Carmichael Irrigation District near Fairoaks has been affirmed in a judgment rendered by Superior Judge Charles O. Busick. The same decision declares valid the $90,000 bond issue for the district. Bids for the bonds will be received on August 23.

BANNING, CAL.—Final surveys have been made on lands of the Morengo Development Company in Morengo Valley. The company has diverted the course of Big Morengo Creek, where 200 inches of water are flowing at this season, and by tunneling and piping will bring it upon their lands.

SAN DIEGO, CAL.—The San Diego Consolidated Gas & Electric Company is constructing a brick garage and blacksmith shop adjacent to the electric plant to take care of all the company's motor vehicles. A new gas generator will also be erected, and a new gas purifier will be built in the near future.

PLACERVILLE, CAL.—The Chamber of Commerce, by unanimous vote, has placed itself on record as favoring the organization of an irrigation district embracing all irrigable land in the southwestern part of the county, between Pleasant Valley and the Sacramento county line. The project is known as the Diamond Ridge Water district.

OROVILLE, CAL.—Engineer Cauthard declares it will not be necessary for land owners in the low districts adjacent to Oroville to form water districts in order to obtain an abundance of water from the Western Canal Company. If the land owners promise a sufficient acreage to warrant the company bringing the water to a central point they will be supplied with water.

PLACERVILLE, CAL.—The property owners of the southwestern part of El Dorado county at a meeting at Rescue rejected the proposition to bond their land at $40 an acre for the purpose of buying the Diamond Ridge Ditch Company's water system, buying the reservoir sites, building reservoirs and doing everything else that was necessary to establish the proposed water system.

SUSANVILLE, CAL.—The supervisors of Lassen county have called an election for September 7th for the purpose of determining whether or not the Honey Lake Valley Irrigation District shall be formed. The proposed district comprises approximately 30,000 acres, all within a radius of ten miles of Amedee. The estimated cost is $956,000, and it is proposed to utilize the waters of Eagle Lake, Willow Creek, Susan River and many smaller streams.

SAN FRANCISCO, CAL.—The California Farm & Irrigation Company has plans under way for conveying water from the Colorado River in Riverside county to 60,000 acres, the works to be known as the Palo Verde Irrigation Canal. The water is to be diverted from the river by pumping plants, and the estimated cost of the project is given as $2,300 000. The details of the proposition are as yet incomplete.

MEDFORD, ORE.—An election will soon be held for the establishment of another irrigation district in this valley, comprising 25,000 acres of the most fertile lands in the heart of the territory east of Bear Creek. It will cost the company about $600,000 to supply the water. It is estimated that 90 per cent of the farmers in that district will vote for the establishment of the district.

BUTTER CREEK, ORE.—A petition calling for the formation of an irrigation district to water 7000 acres of land adjoining the proposed Teel irrigation district in eastern Oregon, near Echo, has been filed with the county court there, which will sit and consider the application on September 2. The estimated cost is not given, but it is intended to secure water from the proposed Teel project, most likely tapping the source of supply near the talked-of Lehman Springs reservoir. The Butter Creek work, though, would involve a complete lateral distributing system. The contract for both the work and the bonds for the Teel project, aggregating more than $1,000,000, has been awarded to the Henry J. Kaiser Company, 830 Northwest Bank Building, this city, for which A. J. Welton is manager. While no definite date has been set, it is thought very likely that the contractors will have the job under way in the near future.

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### CONDUIT FITTINGS.

#### Type A."

Castings Only.

| | List. | Sell. |
|---|---|---|
| A-1, ½ in. | $ .24 | $ .25 |
| A-2, ¾ in. | .31 | .35 |
| A-3, 1 in. | .43 | .45 |
| A-4, 1¼ in. | .62 | .65 |
| A-5, 1½ in. | .80 | .80 |
| A-6, 2 in. | 1.66 | 1.66 |
| A-7, 2½ in. | 4.95 | 4.95 |
| A-8, 3 in. | 5.45 | 5.45 |

#### Types "B" and "E."

| | | |
|---|---|---|
| B-1, ½ in. | .29 | .30 |
| B-2, ¾ in. | .36 | .40 |
| B-3, 1 in. | .50 | .50 |
| B-4, 1¼ in. | .80 | .80 |
| B-5, 1½ in. | 1.04 | 1.05 |
| B-6, 2 in. | 2.14 | 2.14 |

#### Types "C" and "D."

| | | |
|---|---|---|
| C-1, ½ in. | .36 | .40 |
| C-2, ¾ in. | .41 | .45 |
| C-3, 1 in. | .59 | .60 |

#### Type "F."

| | | |
|---|---|---|
| F-1, ½ in. | .50 | .50 |
| F-2, ¾ in. | .65 | .65 |
| F-3, 1 in. | 1.05 | 1.05 |
| F-4, 1¼ in. | 1.64 | 1.65 |
| F-5, 1½ in. | 2.52 | 2.50 |
| F-6, 2 in. | 4.40 | 4.40 |
| F-7, 2½ in. | 11.70 | 11.70 |
| F-8, 3 in. | 14.20 | 14.20 |

#### Type "G."

| | | |
|---|---|---|
| G-1101, ½ in. | .65 | .65 |
| G-2102, ¾ in. | .80 | .80 |
| G-3103, 1 in. | 1.00 | 1.00 |

#### Type "H."

| | | |
|---|---|---|
| H-110, ½ in. | .55 | .55 |
| H-210, ¾ in. | .70 | .70 |
| H-310, 1 in. | .90 | .90 |

**The correctness of these suggested selling prices is not guaranteed by the publisher.**

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#### Type "J" with Receptacle for Shade Groove.

| | List. | Sell. |
|---|---|---|
| J-11227-G, ½ in. | 1.05 | 1.05 |
| J-22227-G, ¾ in. | 1.20 | 1.20 |
| J-33227-G, 1 in. | 1.50 | 1.50 |

#### Type "JL" with Receptacle for Shade Groove.

| | | |
|---|---|---|
| J-11227-LG, ½ in. | 1.30 | 1.30 |
| J-22227-LG, ¾ in. | 1.40 | 1.40 |
| J-33227-LG, 1 in. | 1.50 | 1.50 |

#### Type "J" with Cord Rosette.

| | | |
|---|---|---|
| J-11332, ½ in. | .90 | .90 |
| J-22332, ¾ in. | 1.05 | 1.05 |

#### Type "JL" with Cord Rosette.

| | | |
|---|---|---|
| J-11332-L, ½ in. | 1.15 | 1.15 |
| J-22332-L, ¾ in. | 1.25 | 1.25 |

#### Type "J" with Receptacle Without Shade Groove.

| | | |
|---|---|---|
| J-11227, ½ in. | 1.00 | 1.00 |
| J-22227, ¾ in. | 1.15 | 1.15 |

#### Type "JL" with Receptacle Without Shade Groove.

| | | |
|---|---|---|
| J-11227-L, ½ in. | 1.25 | 1.25 |
| J-22227-L, ¾ in. | 1.35 | 1.35 |

#### Type "J"—Casting Only.

| | | |
|---|---|---|
| J-11 | .60 | .60 |
| J-22 | .75 | .75 |
| J-33 | 1.05 | 1.05 |

#### Type "JL"—Castings Only.

| | | |
|---|---|---|
| J-112 | .85 | .85 |
| J-222 | .95 | .95 |
| J-332 | 1.05 | 1.05 |

#### Type "K" With Edison Receptacle (Shade Holder Type).

| | | |
|---|---|---|
| K-1127-G, ½ in. | .95 | .95 |
| K-2227-G, ¾ in. | 1.10 | 1.10 |
| K-3227-G, 1 in. | 1.40 | 1.40 |

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